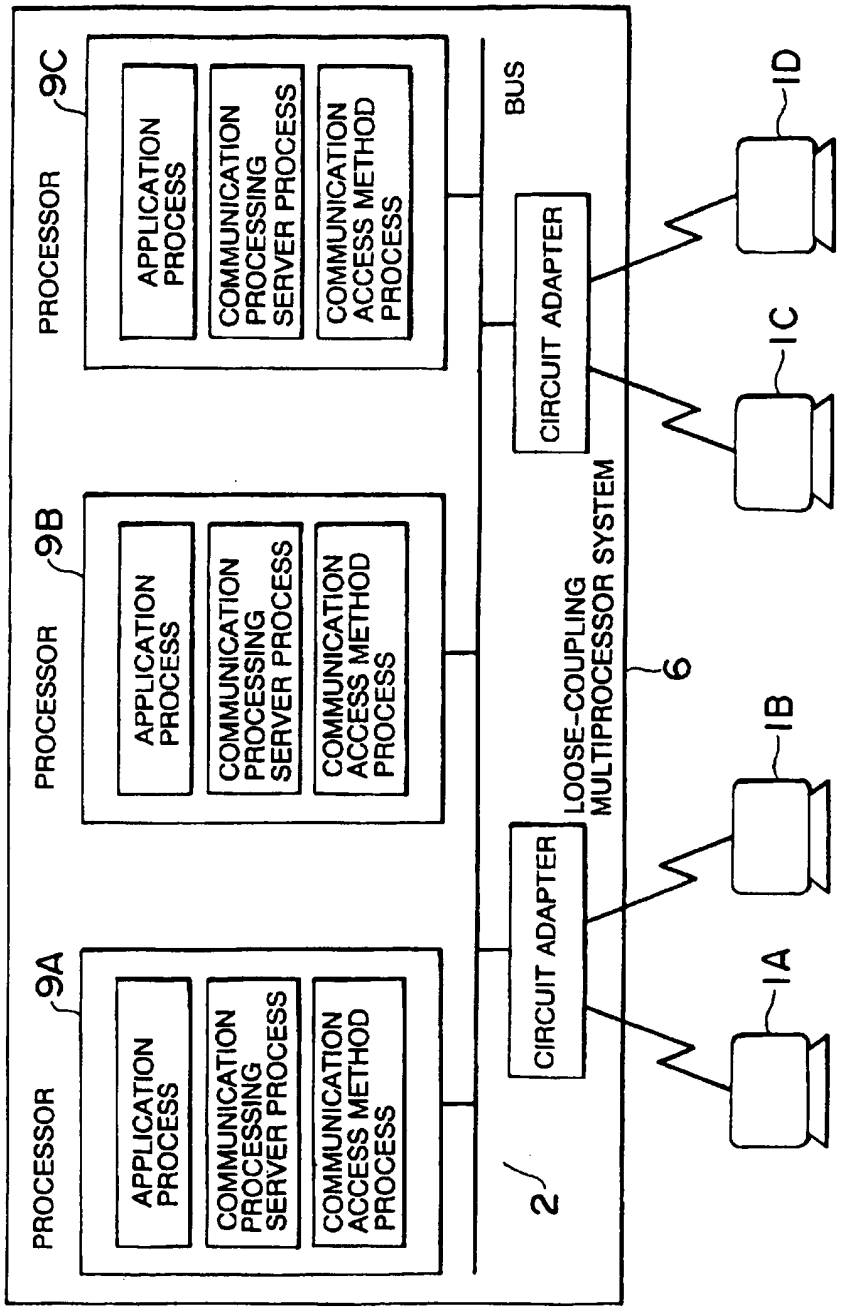
FIG.2



communication processing application executed by the communication processing application executing means, and the changing/updating the name of the connecting destination of the specified terminal by the communication processing application by use of the FEP system and thus effecting the processes of the communication processing application and the communication access method.

The network system shown in FIG. 1 includes terminals 1A, 1B, switched network 2, FEP system 3, circuit/network 4 and host 5.

The terminals 1A and 1B are operated by the users, that is, operators. In FIG. 1, two terminals 1A and 1B are shown, but three or more terminals may be connected to the switched network 2.

The switched network 2 connects the terminals 1A and 1B to the FEP system 3.

The FEP system 3 is connected to the host 5 via the circuit/network 4. In FIG. 1, only one host 5 is shown, but a plurality of hosts may be connected to the circuit/network 4 via network nodes. Likewise, in FIG. 1, only one FEP system 3 is shown, but a plurality of FEP systems may be connected to the circuit/network 4 via network nodes. Also, in this case, each FEP system is connected to a plurality of terminals via a switched network.

The host 5 includes a communication processing application executing section 51 for executing the communication processing application, a communication processing server section 52 for executing the communication processing server and a communication access method processing section 53 for processing the communication access method.

Also, the FEP system includes a communication processing application executing section 31 for executing the communication processing application, a communication processing server section 32 for executing the communication processing server and a communication access method processing section 33 for processing the communication access method. In general, the performance of the communication processing application executing section 31 of the FEP system 3 may be lower than the performance of the communication processing application executing section 51 of the host 5.

The FEP system 3 performs the management and connection of the network node and processor for connecting the terminal in response to the dialing from the terminal 1A, 1B. The FEP system refers to the network node registered as a name of a connecting destination for a terminal specified by the communication processing application executed by the communication processing application executing section 31. The FEP system updates the name of the connecting destination of the specified terminal by the communication processing application.

The communication processing application executing section 31 and the communication access method processing section 33 are connected to each other via the communication processing server section 32.

The communication processing application executing section 31 has a function of informing a network node name registered as a connecting destination name of the specified terminal in the node management table to the communication processing application when the communication processing application operated in the FEP system specifies a terminal name and issues a system call of reference to the destination name. Section 31 also has a function of updating the connecting destination name of the specified terminal in the node management table to a specified network node name when the communication processing application specifies the terminal name and network node name and issues a system call of updating of the destination name. Section 31 also has a function of deriving operation information which the communication processing application utilizes to change the connecting destination name of the terminal.

The communication access method processing section 33 holds a node management table indicating the connecting relation between the terminals and the network nodes of the processors to be connected to the terminals for each terminal unit. Section 33 also has a function of managing the connection of one of the network nodes of one of the processors to which the terminal is connected when dialing is made from the terminal to the FEP system. Section 33 also has a function of referring to the connection node management table to determine a connection network node and transmit a connection request to the node when dialing is made from the terminal to the FEP system.

The communication processing application executing section 31 refers to the operation schedule of the host and the communication access method processing section 33 may deal with the connection node of the terminal as a network node in the host at the time of operation of the host based on the operation schedule of the host and may change the destination as the network node in another host which can be used instead of the former host at the time of interruption of the former host.

Further, the communication processing application executing section 31 refers to the operation schedule of the host. The communication access method processing section 33 deals with the connection node of the terminal as a network node in the host at the time of operation of the host based on the operation schedule of the host. Section 33 also deals with the communication processing application executed in the FEP system as the network node to be connected to the terminal and change the destination at the time of interruption of the host.

The communication processing application executing section 31 may determine the operation schedule by permitting the communication processing application operated in the FEP system and the communication processing application operated in the host to be communicated to each other.

Thus, in the network system of FIG. 1, in a case where the FEP system 3 having the communication processing application incorporated therein is connected to at least one host 5 and the terminal 1A, 1B is connected to a node in the network at the time of execution of the operation, a connection request can be distributed from the FEP system 3 to network nodes which are effective at this time simply by dialing to the FEP system 3 and the terminal 1A, 1B can be connected to the effective node. Therefore, in the network system of FIG. 1, it is possible to flexibly and adequately control the destination management, take the countermeasure against defects, and effect the operation process according to the operating condition of the system between a switched network to which the terminal is connected and a network to which the host processor is connected when dialing is made from the terminal.

Second Embodiment

The principle construction of a multiprocessor system according to a second embodiment of the present invention is shown in FIG. 2.

The multiprocessor system shown in FIG. 2 includes a loose-coupling multiprocessor system which has a plurality of multiprocessors connected in parallel arrangement to an

input/output bus. Each processor includes an application process section, communication processing server process section and communication access method process section. The communication processing server process section derives a processor identifying number from a communication identifier, which is set with its inherent meaning in the multiprocessor system and includes a processor identifying number specified according to the terminal of transmitting destination and an array number in the terminal management table stored in the processor at the time of execution of a system call of data transmission by the application process. This permits the data transmission/reception process to be effected by use of the application process in each processor by sending transmission data to a processor determined by the processor identifying number so as to effect the transmission process to the terminal by the communication processing server process of the processor. This permits a processor to which the terminal is connected to be dynamically changed. This permits the terminal to be commonly used by the application processes of the respective processors, thus making it possible to always effect the operations.

The multiprocessor system includes terminals 1A, 1B, 1C and 1D and a loose-coupling multiprocessor system 6.

The loose-coupling multiprocessor system 6 has processors 9A, 9D and 9B and each of the processors 9A, 9B and 9C includes an application process execution section, communication processing server process execution section and communication access method process execution section. The terminals 1A, 1B, 1C and 1D are connected to the processors 9A, 9B and 9C via a switched network 2.

The communication processing server process execution section derives a processor identifying number from a communication identifier specified for the terminal of transmitting destination and sends transmission data to a processor determined by the processor identifying number to effect the transmission process to the terminal by the communication processing server process in the processor at the time of execution of a system call of data transmission by the application process. The communication identifier is defined with its inherent meaning in the multiprocessor system so as to include a processor identifying number and an array number in the terminal management table stored in the processor.

The communication processing server process execution section derives an inherent number in the multiprocessor system obtained by a combination of the processor identifying number and the array number in the terminal management table in the processor as the communication identifier at the time of connection of the terminal to the processor, and informs the communication identifier to the application process at the time of informing of the processing result of the terminal connection and derives a processor identifying number from the communication identifier specified for the terminal of transmitting destination at the time of execution of the system call of data transmission by the application process.

It is possible that the loose-coupling multiprocessor system 6 gives a standby attribute to one processor and gives an available attribute to the remaining processor or processors. The standby processor is used to be operated as a back-up processor when the available processor is damaged. Each processor is given a preset logical processor name. The standby processor takes over the logical processor name of the available processor and the array number of the logical processor name list is allotted as the processor identifying number when the standby processor backs up the available processor which becomes defective. In this case, even after the standby processor takes over the terminal which has been connected to the available processor. The relation between the terminal and the communication identifier can be kept unchanged.

Further, the multiprocessor system can be used as the FEP system in the network system.

In the multiprocessor system 6 of FIG. 2, a communication identifier structured as a combination of two information items, that is, the processor identifying number and the array number in the terminal management table is dynamically allotted by the communication processing server process at the time of connection of the terminal, the communication identifier which is defined with its inherent meaning in the multiprocessor system is informed to the application process, processors are determined based on the communication identifiers specified for the respective connection terminals at the time of transmission system call for the connected terminal by the application process, and the transmission process is influenced by sending transmission data to the processors.

Therefore, even when the processor becomes abnormal and the back-up processor takes over the corresponding terminal, the universality of the interface of transmission system call can be kept. That is, the multiprocessor system 6 of FIG. 2 can effect the data transmission/reception process by use of the application process in each of the processors and permit a processor for connecting the terminal to be dynamically changed so as to make it possible to commonly use the terminal by the application process in each processor, thus making it possible to always effect the operation and adequately use the multiprocessor system for the destination management, countermeasure against defects, and operation process in the network system.

Third Embodiment

The construction of a network system according to a third embodiment of the present invention is shown in FIG. 3. In FIG. 3, portions which are substantially the same as those of FIG. 1 are denoted by the same reference numerals.

The network system of FIG. 3 includes terminals 1A, 1B . . . . switched network 2, FEP system 3, circuit/network 4, and hosts 5A . . . .

The terminals 1A, 1B . . . are connected to the FEP system 3 via the switched network 2.

The FEP system 3 is connected to at least one host 5A . . . via the circuit/network 4 constructed by a high-speed LAN (Local Area Network) circuit or network circuit.

The hosts 5A . . . each include a communication processing application execution section 51 for executing the communication processing application, a communication processing server section 52 for effecting the communication processing server process, and a communication access method process section 53 for effecting the process of the communication access method.

Also, the FEP system 3 includes a communication processing application execution section 31 for executing the communication processing application, a communication processing server section 32 for effecting the communication processing server process, and a communication access method process section 33 for effecting the process of the communication access method. In general, the communication processing application executing section 31 of the FEP system 3 may be of smaller scale in performance than the communication processing application executing section 51 of the host 5.

US005764914A

United States Patent [19]

Goto et al.

[11] Patent Number: 5,764,914

[45] Date of Patent: Jun. 9, 1998

[54] **NETWORK SYSTEM FOR CONNECTING TO A NETWORK NODE FROM TERMINAL**

[75] Inventors: **Hisasi Goto**, Kawasaki; **Noritoshi Nakao**, Kobe, both of Japan

[73] Assignee: **Fujitsu Limited**, Kawasaki, Japan

[21] Appl. No.: **301,781**

[22] Filed: **Sep. 7, 1994**

[30] **Foreign Application Priority Data**

Dec. 15, 1993 [JP] Japan 5-315530

[51] **Int. Cl.**[6] **G06F 15/16**; G06F 13/14

[52] **U.S. Cl.** **395/200.57**; 395/200.8; 395/200.69

[58] **Field of Search** 395/200.02, 200.03, 395/200.1, 200.12, 200.18, 200.2, 200.79, 200.31, 200.5, 200.57, 200.76, 200.8, 200.69; 370/228, 462

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,823,122	4/1989	Mann et al.	364/156
5,043,881	8/1991	Hamazaki	395/200.57
5,289,578	2/1994	Hartheimer et al.	395/200
5,341,477	8/1994	Pitkin et al.	395/200
5,371,852	12/1994	Attanasio et al.	395/200
5,448,723	9/1995	Rowett	395/200.02
5,465,330	11/1995	Komatsu et al.	395/824
5,475,819	12/1995	Miller et al.	395/200.03
5,539,884	7/1996	Robrock, II .	

FOREIGN PATENT DOCUMENTS

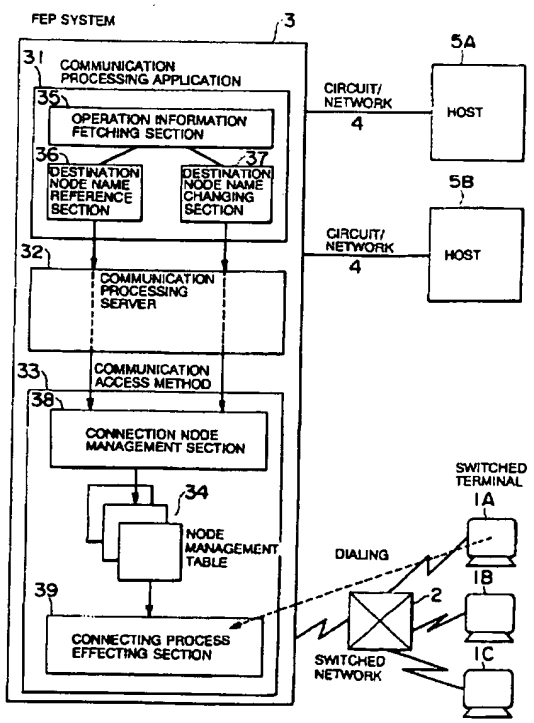
330 835	9/1989	European Pat. Off. .
475 277	3/1992	European Pat. Off. .
511 142	10/1992	European Pat. Off. .
1-276952	11/1989	Japan .
2-28866	1/1990	Japan .
3-254540	11/1991	Japan .
3-266156	11/1991	Japan .
5-53946	3/1993	Japan .
2 251 358	7/1992	United Kingdom .

Primary Examiner—Mark H. Rinehart
Attorney, Agent, or Firm—Staas & Halsey

[57] **ABSTRACT**

In a computer network, a front end processor (FEP) is connected to at least one processor via a network node and connected to a plurality of terminals via a switched network. The FEP has means for executing a communications processing application, a means for creating and managing connections between the front end processor and the network nodes upon request from a terminal, a means for referring to the network nodes to be used by the particular terminal by a logic name, rather than its physical address, when communicating, and a means for changing and/or updating the logical name to be used by the terminal when addressing the network node. The FEP has an internal connection means holding a node management table indicating connection relationships between the terminals and network nodes so that no access to a name server is required. This reduces network traffic and facilitates flexibility in setting connections.

7 Claims, 21 Drawing Sheets



US005764914A

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[75] Inventors: **Hisasi Goto**, Kawasaki; **Noritoshi Nakao**, Kobe, both of Japan

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[21] Appl. No.: **301,781**

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[58] **Field of Search** 395/200.02, 200.03, 395/200.1, 200.12, 200.18, 200.2, 200.79, 200.31, 200.5, 200.57, 200.76, 200.8, 200.69; 370/228, 462

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5,475,819	12/1995	Miller et al.	395/200.03
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FOREIGN PATENT DOCUMENTS

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511 142	10/1992	European Pat. Off. .
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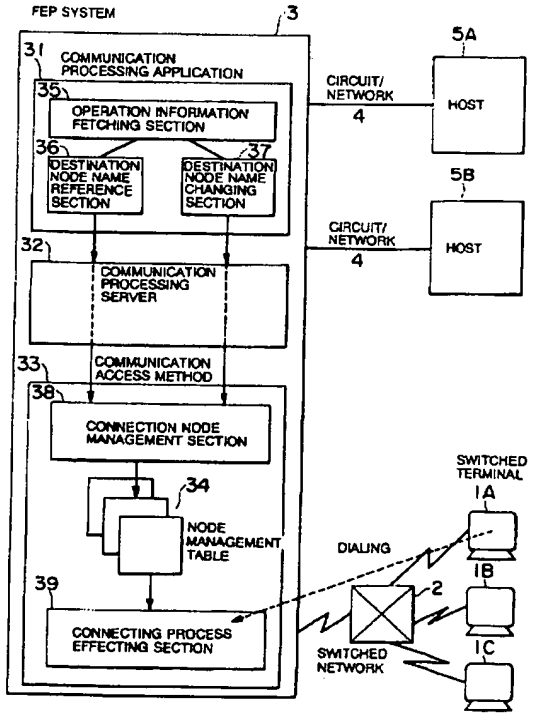
2 251 358	7/1992	United Kingdom .

Primary Examiner—Mark H. Rinehart
Attorney, Agent, or Firm—Staas & Halsey

[57] **ABSTRACT**

In a computer network, a front end processor (FEP) is connected to at least one processor via a network node and connected to a plurality of terminals via a switched network. The FEP has means for executing a communications processing application, a means for creating and managing connections between the front end processor and the network nodes upon request from a terminal, a means for referring to the network nodes to be used by the particular terminal by a logic name, rather than its physical address, when communicating, and a means for changing and/or updating the logical name to be used by the terminal when addressing the network node. The FEP has an internal connection means holding a node management table indicating connection relationships between the terminals and network nodes so that no access to a name server is required. This reduces network traffic and facilitates flexibility in setting connections.

7 Claims, 21 Drawing Sheets



US006014382A

United States Patent [19]

Takihiro et al.

[11] Patent Number: 6,014,382

[45] Date of Patent: Jan. 11, 2000

[54] **ATM SWITCHING SYSTEM INCLUDING A SWITCHING CONTROL PORTION FOR DISTRIBUTING CALL SET-UP REQUIREMENT SIGNALS**

[75] Inventors: **Masatoshi Takihiro**; **Toshihiko Murakami**, both of Fujisawa; **Osamu Takada**, Sagamihara; **Tomihisa Nishijima**, Hadano, all of Japan

[73] Assignee: **Hitachi, Ltd.**, Tokyo, Japan

[21] Appl. No.: **08/831,242**

[22] Filed: **Apr. 2, 1997**

[30] **Foreign Application Priority Data**

Apr. 4, 1996 [JP] Japan 8-082286

[51] **Int. Cl.**[7] **H04L 12/56**

[52] **U.S. Cl.** **370/399**; 370/410

[58] **Field of Search** 370/395, 396, 370/397, 398, 399, 410, 389, 392

[56] **References Cited**

U.S. PATENT DOCUMENTS

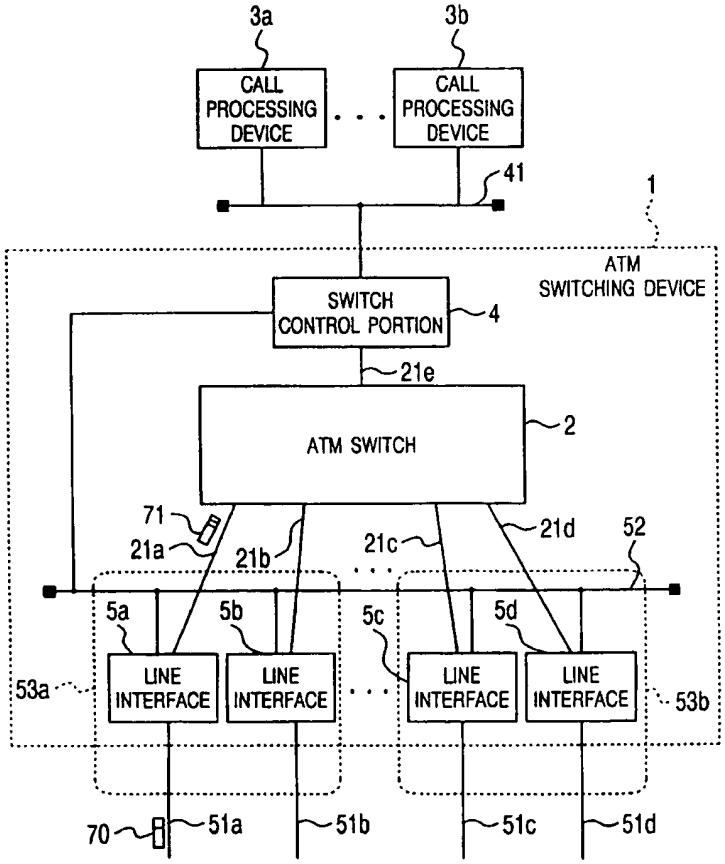
4,956,839	9/1990	Torii et al.	370/395
5,483,525	1/1996	Song et al.	370/399
5,483,527	1/1996	Doshi et al.	370/399
5,859,846	1/1999	Kim et al.	370/395

Primary Examiner—Hassan Kizou
Assistant Examiner—Daniel Prévil
Attorney, Agent, or Firm—Antonelli, Terry, Stout & Kraus, LLP

[57] **ABSTRACT**

An ATM switching system provided with a plurality of call processing devices, a plurality of line interfaces for inputting and outputting an ATM cell, an ATM switch connected to the plurality of line interfaces for switching the ATM cell, and a switch control portion connected to the ATM switch, the plurality of line interfaces and a plurality of call processing devices. Requirement information related to call processing input from line interfaces is collected once in the switch control portion. The switch control portion determines to which of the plurality of call processing devices the requirement information is to be distributed based on the information related to the input-output line, a state of processing capability of the call processing device, etc. The related line interface is set directly from switch control portion through a bus based on the control information from determined one or a plurality of call processing devices.

42 Claims, 37 Drawing Sheets



US-PAT-NO: 6014382

DOCUMENT-IDENTIFIER: US 6014382 A

TITLE: ATM switching system including a switching control portion for distributing call set-up requirement signals

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Brief Summary Text - BSTX (4):

However, the allocation of lines to the call processors when the system is used practically is fixed. Therefore, in case a fault is generated in one call processor, the lines allocated to the call processor become unusable. Further, dynamic **load sharing** by allocating lines to the call **processor** with the fluctuation of the load required for call processing during operation is not performed. Furthermore, it is structured so that the allocation of line interfaces to the call processing devices can be altered by means of software by transmitting and receiving a control message between a call processor and respective line interfaces through a virtual channel of an ATM switch which can be altered by software. However, restructure from cells into control messages becomes necessary in the line interface portion, and the structure of the line interfaces becomes complicated.

Detailed Description Text - DETX (61):

According to an ATM **switching system of the present invention, it is also possible to process with switching** by forming a structure of a plurality of ATM switching devices and a plurality of call processing devices. FIG. 26 is a block diagram showing another structural example of an ATM switching system of the present invention. As an example, an ATM switching system is structured of two ATM switching devices 1c and 1d and two call processing devices 3d and 3e. Switch control portions 4c and 4d of the ATM switching devices 1c and 1d and the call processing devices 3d and 3e are connected to one another with a call control message communication line 52b, and the call processing devices 3d and 3e perform processing of a call with the ATM line belonging to line groups 53d and 53e, respectively, as the calling system or an output ATM line.